NICE^3 Technical Periodic Report #6

1. Title / State / Company

Precision Irrigation Technologies for the Agricultural Industry
Colorado Office of Energy Management and Conservation
Colorado Corn Administrative Committee

2. Periodic Activity Summary - In a narrative format, briefly describe the technical progress for the period.

Two planning meetings have been held with project participants to discuss results from 2001 and to develop and coordinate specific plans for 2002. As part of the production scale demonstration in 2001, water sensitive cards were used for three field tests on the two AccuPulse systems to assess the application uniformity under field conditions and to compare performance with competing application methods. In 2002 we will compare the application uniformity and the canopy penetration of AccuPulse with other spray technologies. Field evaluations of application uniformity have been discussed with our new cooperating farmer at the Wiggins site, who has expressed his willingness to continue serving as a demonstration host partner. Project personnel participated in several precision-farming continuing education programs.

3. Milestone Table

a) Describe technical progress for the period, with ongoing activities and discuss the actions taken to meet the milestone deadlines.

Milestone 16: Lab analyses of soil cores taken for correlation with maps have been completed. Analysis work relating to soil parameters is in progress.

Milestone 17: Work is continuing on building the support structure and programming a control system that uses individual tower operational data already collected in the field to duplicate field operation times in the lab.

Milestones 19 - 22: Design work has been completed; products will be developed during the upcoming growing season in order to incorporate project progress and results.

b) Provide an explanation of technical difficulties encountered while testing, installing, or operating the system.

One concern with using the AccuPulse system at the Wiggins site is that the producer intends to use the endgun on the outer perimeter of the field. Here the crop does not receive the applied

chemical from the AccuPulse, so an alternate means of application is needed to apply the necessary chemicals.

c) Explain the steps taken to resolve these difficulties.

The irrigation equipment supplier for Valmont is attempting to obtain a small independent spray unit to be mounted on the center pivot system at the end of the main pipeline, to apply the necessary chemical after the AccuPulse application.

d) Describe any known or potential changes in milestone dates.

N/A

e) Address activities and planned accomplishments for the upcoming quarter.

The Wiggins field grid will be sampled around mid-March (timing dependent on weather). Then the soil results will be mapped and fertilizer recommendations will be produced for both Wiggins and Yuma demonstration sites. We will use these maps to finalize our management zones.

The potatoes will be planted the first week of April at the Wiggins site and corn will be planted at the Yuma site the first of May. At this time Servitech will start scouting the management zones for weeds, insects, and crop health. Aerial photos will be used later this spring to assist in determining management zones.

Irrigation wells will be tested for efficiency and water levels and soil moisture blocks will be installed at both the Yuma and Wiggins demonstration sites.

4. Discuss results (testing etc.) and their implications to the project. Discuss any necessary or anticipated milestone additions or deletions.

The results of the application uniformity tests indicate satisfactory performance of the AccuPulse. In the 2001 tests, the uniformity for ground applicators was slightly better than the AccuPulse, but aerial application was slightly worse.

Results indicate the coefficient of variation ranged from 16.8% to 43.1% although the higher values occurred when the crop was large enough to interfere with the spray droplets. Additional uniformity and canopy penetration tests under different wind and crop conditions are needed to cover the expected range of conditions for producers. The implications of large droplet size from the AccuPulse in windy conditions and for penetrating the crop canopy will be investigated in the coming year.

Use of surfactants or adjuvants will be investigated as a means of possibly improving coverage uniformity, possibly using an existing small experimental pivot. Plans have also been made to use water sensitive cards and cellulose cards to collect chemical droplets at several levels to assess the amount of chemical penetration within the crop canopy. This evaluation will be very helpful in assessing the chemical residue left on the plants after application.

The soil tests show that we can apply less fertilizer this year. Also the well tests show that we have very adequate water for the corn and potatoes.

5. Attach publications written that relate to the project (internally or externally produced). List any planned publications or conferences to be attended related to the project for the next quarter.

Project personnel with the USDA-ARS made a PowerPoint presentation to about 30 people at a customer focus group meeting reviewing precision farming research.

During the next quarter, Y-W Well Testing will help sponsor and participate in a youth waterfest and continue to work with the Irrigation Research Farm.

6. Discuss any key personnel changes (including state, cost-share, subgrantee, and others involved).

We have briefly discussed the project and the future direction of AccuPulse with Jake LaRue, new product manager for AccuPulse at Valmont Industries.

USDA-ARS has hired an additional undergraduate student to assist with setup and testing of the AccuPulse this summer. A new weed scientist joined the USDA-ARS unit in December 2001 and has interest in evaluating herbicide efficacies and pesticide binding on soils.

7. Discuss any cost-sharing partner/demonstration partner changes.

The project welcomes a new cooperating farmer at the Wiggins demonstration site. He will be growing potatoes in 2002 and is very interested in trying the AccuPulse for his fungicide applications. We hope to have a side by side comparison on the efficacy of fungicides when applied with the AccuPulse and through chemigation.

8. Discuss any other topics that are relevant to the scope and progress of the project.

Y-W Well Testing continues to be on the Ogallala Symposium planning committee, which provides an excellent forum for disseminating information about this project.